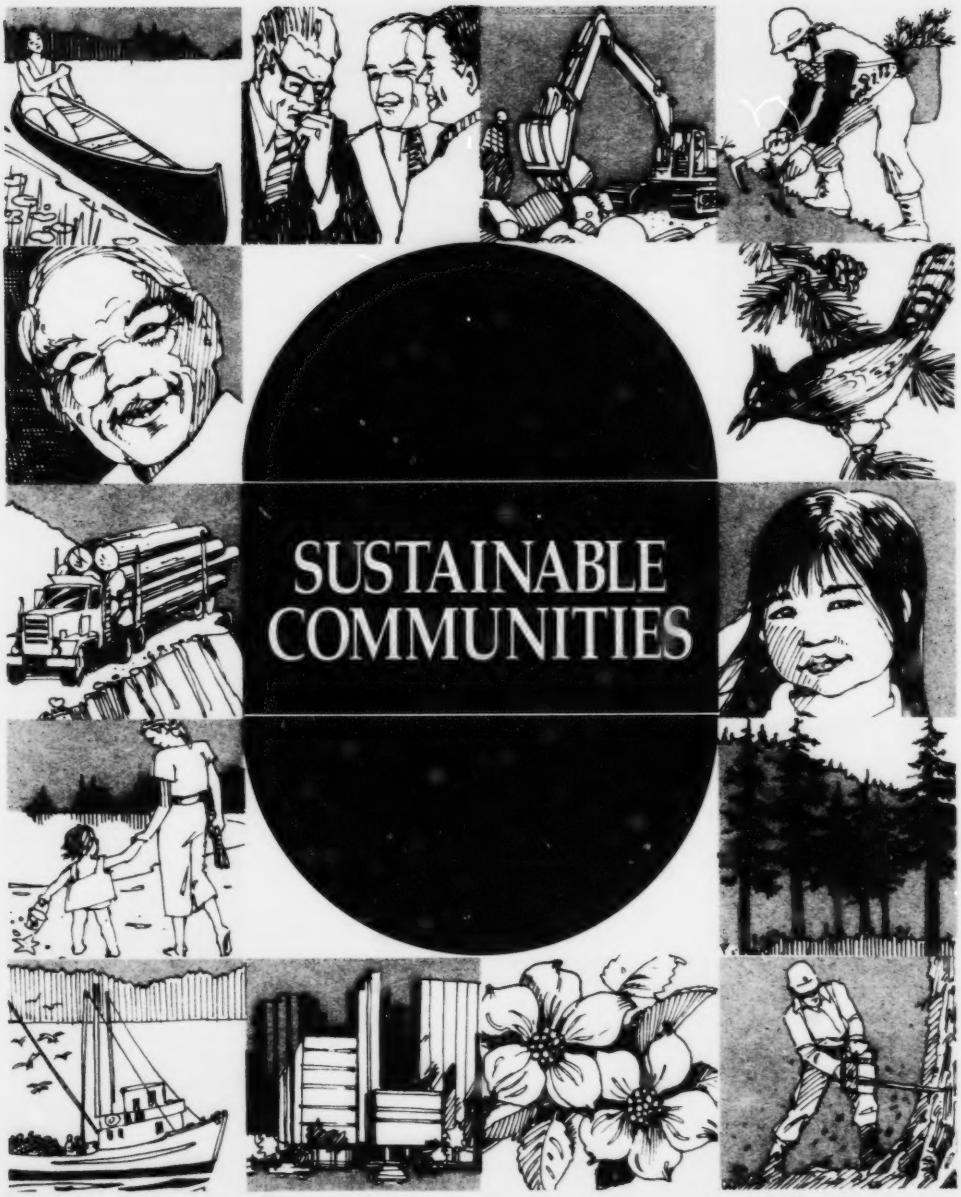

British Columbia Round Table on the Environment and the Economy

91-03874/

Canadian Cataloguing in Publication Data

Main entry under title:
Sustainable communities

Includes bibliographical references: p.
ISBN 0-7726-1254-4

1. Environmental policy - British Columbia.
2. Cities and towns - Environmental aspects - British Columbia. I. British Columbia Round Table on Sustainable Communities.

HC117.B7S97 1991 333.7'09711 C91-092052-4

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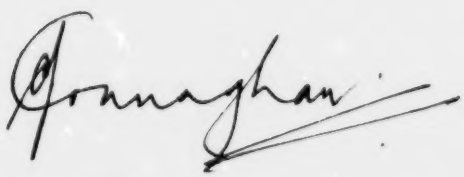
Preface

Sustainable Communities is a theme paper developed by the British Columbia Round Table on the Environment and the Economy. Its content reflects a consensus by the Round Table members on a number of major issues and options related to sustainable communities.

This paper is intended to stimulate public discussion on the elements of a Sustainable Development Strategy for British Columbia. It is hoped that **Sustainable Communities** will provide a starting point for dialogue and will assist in determining the goals and values held by the public. The ensuing dialogue may reveal other appropriate issues to be addressed by the Round Table. **Sustainable Communities** is a companion to the Round Table's document **A Better Way**.

The Round Table welcomes your views and advice on this and other subjects related to a sustainable development strategy for British Columbia.



C.J. Connaghan
Chairman

Executive Summary

The problems that we have, whether they are environmental, social, or economic are hardest felt at the community level. The need to do something about them is therefore most urgent and, when something is done about them, the benefits are most apparent.

If we apply the idea of sustainable development to communities, then we should also be able to create **sustainable communities**. What would they look like? Each would of course be different, but we might be able to describe an **ideal** sustainable community. To do this, we would want to take into account environmental quality, adequate social services, availability of jobs, and the kinds of industries and businesses that would best be suited to environmental and social needs.

An ideal community would adopt a series of **ecological limitations** — limits applied to all forms of pollution and waste to help maintain a clean environment. At the same time, the community would develop **social equity** goals aimed at creating equal opportunities for everyone in areas such as education, health services, social services, or shelter. Finally, the community would work toward **economic viability** by developing different types of industry to provide local employment, to support social needs, and operate within the ecological limitations. Traditional planning approaches of government, business, industry, and individuals do not adequately link ecological, social, and economic factors. This staged approach will reveal these linkages, enabling current and anticipated problems to be fully identified and addressed.

To do all of these things and become sustainable, the community would need to put together a plan. This plan, which should be a community project with everyone involved, would pave the way by agreeing on what the ecological limitations and social equity goals should be, what economic viability should mean, and then how to put them in place.

Communities will need to adopt indicators — ways of measuring their progress towards sustainability — to make sure they are going in the right direction. In order to plan effectively, it may be necessary for the provincial government to give communities extra powers, particularly in areas where decisions might have an effect on the environment.

In the meantime, communities are already wrestling with many environmental, social, and economic problems. These have to be solved before any real progress can be made. Solving them in fact, will generally make it easier in the long term to reach sustainability status.

There are, however, two things that will play an important part in helping to achieve sustainability. The first is an acceptance of the fact that we, as part of society in general, have to change our attitudes about the environment. It will not be enough to be satisfied with a convenient blue box program. Everything we do will have to be done with the environment in mind. It will not always be convenient and it will often be a personal challenge.

The second is wider involvement of local government in land use planning and allocation. This is the process of deciding what will go where, whether it is housing, industries, parks or other green areas, transport routes, or garbage dumps. This is the process that should lead us to a better quality of life and one in which we must all share.

Air Quality

While the greatest future impact on us may be from threats of ozone depletion and global warming, we have some immediate problems that are already affecting many communities. Most of these problems have to do with urban air quality, which in turn is influenced by many different sources of air pollution.

One of the major sources is the automobile because it adds gases such as carbon monoxide and nitrogen oxides to the air. The nitrogen oxides are converted by sunlight into ground-level ozone (smog) that can be harmful to people with breathing problems. Smoke, such as smoke from wood stoves, is equally a health problem because the fine particles can be inhaled, causing irritation of the lungs. An overall problem is that adequate standards for air quality have not been developed, nor are there enough systems in place to allow for proper management of air quality.

Land

The quality of land must be protected. Where we have areas that have been contaminated by industrial chemicals, we must ensure that there are safe and effective methods in place for recognizing and dealing with them.

Water Quality

Community water quality issues mostly have to do with water as a source of drinking water and the difficulties of keeping the sources pure enough. Most of our water comes from water supply areas or watersheds, natural areas in which water is plentiful and can be controlled and stored. Activities such as logging, uncontrolled recreational uses, and residential lot developments, may all threaten water quality. Giardia is a biological contaminant that can cause a variety of illnesses and that has been showing up in some water supplies as a result of contamination.

In some areas groundwater is a primary source of drinking water, or acts as a backup supply. We need to be concerned about the possibilities of contamination of groundwater. Finally, we need to have realistic standards for water quality that will allow communities to seek the right kind of treatment systems where needed.

Waste Management

Managing our wastes properly will be a major challenge. Not only do we have to try and reduce the amount of solid waste we produce — more than 2 kg of garbage per person per day in British Columbia — we also have to change our "throw away" attitudes and behaviour. This does not just mean everyone becoming a recycler, it means being responsible for using "environmentally friendly" products, not buying products in hard-to-dispose-of packages, re-using containers and other items, and composting. In the immediate future, it will probably cost us more to manage our wastes properly, whether through higher tipping fees at the dump, or through various kinds of environmental taxes. In the longer term, the cost savings will be worth it.

Conclusion

The task of developing sustainable communities will be difficult and challenging, but it is a task that must succeed. Success will depend, in the end, on the amount of effort that everyone, not just governments, is prepared to put into a "vision of the future."

What is this vision? As the authors of a report to the City of Vancouver have said: "...combine in one place the things to which humanity aspires on a global basis: a place where human activities enhance rather than degrade the natural environment, where the quality of the built environment approaches that of the natural setting, where the diversity of origins and religions is a source of social strength rather than strife, where people control the destiny of their community, and where the basics of food, clothing, shelter, security, and useful activity are accessible to all." [1].

[1] *Greater Vancouver Regional District,* ***Creating Our Future: Steps to a More Livable Region.*** *Technical Report, July 1990.*

The Challenge

Among all the inhabitants of the planet Earth, the human species is unique in that it is capable of inducing perhaps irreversible changes in the global environment. Rapid population growth has been exceeded only by consumption of energy and by use of ever-depleting resources, the deleterious by-products of which are discharged as wastes to the environment that sustains us.

We may not know the extent to which we can continue to cause environmental damage without setting in motion a major ecological catastrophe, but we can see the warning signs all too clearly: global warming, progressive thinning of the ozone layer, the spread of deserts into former agricultural lands.

The sphere of human activity in its traditional forms of consumption and economic growth is hostile to the future health of the global environment. Yet economic development is necessary if we are to meet our basic needs. In the long term, the survival of the human race will depend on its ability to find a better way to live in, and share, the global environment. It must be a way that balances the need for economic growth with protection and preservation of the environment and with the creation of a better society both for ourselves as well as for generations to come.

The purpose of this paper is to examine how communities can respond to the challenges of the growing threats to both their internal and external natural environments.

Global warming, ozone depletion, or loss of genetic diversity may be global problems, but the global ecological balance is dependent on the achievement and maintenance of balance at lower levels.

It is at the individual, as well as community level, that the consequences of rapid urbanization, uncontrolled economic growth, air pollution, water quality degradation, or rapidly filling landfills are most obvious. It is at this same level that the motivation to solve them is most direct and the benefits of such actions are most readily realized.

These are the internal challenges that are perhaps best exemplified by population growth and development.

Vancouver Island, the Lower Mainland and the Thompson-Okanagan currently contain 85% of the provincial population - a regional disparity that is expected to continue. The two major urban centres, Greater Vancouver and Greater Victoria together account for almost 50%. Concentration in these centres is expected to persist. The resulting density increase creates mounting pressure on ecological, social and economic systems - air quality, transportation, housing and waste management. Should these patterns be allowed to persist in the face of rising environmental and socio-economic costs?

Migration currently accounts for 75% of net provincial growth, a figure that will increase to 80% by 2016. Interprovincial migration accounts for 50% of net population growth, and international migration, 25%. The immigrant population is younger by about 5 years than the host population and will contribute to population growth. The current immigration rate for Greater Vancouver is twice that of Canada. Is this a desirable trend or are there ways of attracting immigrants to other areas of the province?

As elsewhere, British Columbia has an aging population and significant increases in the older age groups are anticipated. B.C. seniors currently make up 13% of the provincial population consuming approximately 75% of health care costs. Will the Province be able to provide an appropriate level of health care in the future, and how will the health care industry expand its services to meet the anticipated demand?

It will be necessary to address the question of the carrying capacity of communities. Carrying capacity, in this case,

means the ability of the community to support an optimum size or density of population. Too low a population will result in unfulfilled expectations for social equity and economic viability - a serious problem in resource-based communities. Too high a population will result in additional stress on environmental quality as well as degraded urban living conditions. It may be desirable to create ways of limiting population growth in rapidly growing areas such as the Lower Mainland and southern Vancouver Island. Conversely, it may be necessary to ensure the maintenance of adequate growth rates in areas of declining population.

Hand in hand with population growth is the equally challenging issue of growth through development. Management of growth is both desirable and necessary to achieve sustainability goals. Management of growth includes reduction of urban sprawl, densification, creation of multi-functional neighbourhoods, revitalisation of transportation systems, affordable housing, retention of open space, and the creation of recreational opportunities.

Development is not, as some would believe, inevitable, nor is it necessarily a direct response to demand. The sustainable community planning and implementation process should use development as an instrument rather than the means to promote growth. The Greater Victoria area, as an example, has seen significant development during the past decade but not without social cost. Unemployment rose by 74%, average house prices increased by 19% each year, and the City of Victoria recorded the highest per capita crime rate in Canada. With growing congestion on the roads, loss of agricultural land, accommodation shortages, and problems with solid and liquid wastes, many of our cities are without a doubt, cities under stress.

The concept of the sustainable community is one in which threats to survival, both internal and external, are recognized and understood, and through adjustment of ecological, social, and economic values and practices, steps are taken to ensure that the future generations of the community will enjoy the same quality of life that we aspire to today.

The Sustainable Community

The three building blocks of the sustainable community model are ecological limitations, economic viability, and social equity.

Ecological Limitations

Ecological limitations are the finite capabilities or limits of the natural environment (ecosystems) to accommodate impacts resulting from human activities. In general, we do not know what these limits are, but we believe that exceeding them may cause irreversible damage to the environment. Living within these limitations will lead to ecological sustainability.

Ecological limitations will be defined by the goals that are set for the management of air in terms of quality, land in terms of productivity, water quality and quantity, the biological diversity of ecosystems, and waste reduction. The objective in each case will be to set standards, create procedures for achieving the standards, and identify ways of measuring progress towards that achievement.

In order to develop ecological limitations it will be necessary to agree on an equitable allocation of jurisdictional roles and responsibilities. It will also be necessary to achieve consensus about the kinds of values, attitudes, and practices needed to support the sustainable community concept.

Economic Viability

Economic viability is diversified economic enterprise. It is a balance between optimum population range and jobs, and a balance between the long-term supply of local renewable resources and local consumption patterns. It is economic activity conditioned by ecological constraints.

Economic viability means that communities must pursue economic well-being while recognizing that national and provincial policies may set limits to material growth. It means that harvest rates in the renewable resource-based economy must be limited to sustainable rates of production rather than being responsive to an ever-increasing market demand. It means that we must practice full cost accounting in order to encourage maintenance of the natural resource base. It means that communities must choose economic enterprise that is able to function within the goals, objectives, and standards of ecological sustainability.

Social Equity

Social equity is the achievement of an equal opportunity for all members of the sustainable community to enjoy a good quality of life.

It is based on the assumption that the individual members of the community - and therefore the community as a whole - have rights and obligations that are essential to meeting the basic needs of life, health, and well-being. These rights will be an expression of broad societal values and will therefore lie beyond the scope of individual communities to develop.

Achieving social equity, and therefore social sustainability, means having access to: the decision-making processes affecting the sustainable community; equal opportunities for education and training; adequate recreational opportunities, health care, social support services, and housing; a quality environment; and an opportunity to earn a livelihood.

The Sustainable Community Model

The sustainable community model is based on the adoption of a set of environmental values or guiding principles that will provide a context within which each of the elements of the three building blocks — ecological limitations, economic viability and social equity — is reviewed and acted upon.

The model assumes that it will be necessary to establish the ecological limitations in parallel with the development of goals for achieving social equity. Creation of ecological limitations and social equity goals will then provide the framework within which economic sustainability should be pursued.

The achievement of economic sustainability goals will lead, in turn, to the creation of the sustainable community.

It is anticipated that the individual elements of the model will be highly variable in "real world" applications. The large urban community as typified by the City of Vancouver may place more emphasis on defining its ecological limitations and social equity goals than on its already diversified economy. Rural centres, possessing a more intimate relationship with their resource-based hinterlands, will require a more balanced treatment of each of the building blocks.

Relationships within the Ideal Model

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Achieving the Sustainable Community

The process of achieving sustainability will require a number of actions by a community. These actions will only be effective, however, if sustainable environmental and land use planning becomes a requirement at the regional district level and if the provincial government is prepared to allocate appropriate statutory responsibilities to the community level. This argument is based on the need for a sustainable policy framework that takes into account regional characteristics. Provincial level planning would be too broad and municipal level planning is too detailed.

The process should consist of: sustainable community planning, including population change; community empowerment; selecting indicators of sustainability; and the development of methodologies for auditing ecological, economic, and social performance.

Sustainable Community Planning

The suggested community planning process is derived largely from the 1988 Planning Action Forum held in Vancouver.

- Develop a community value system that encompasses the environment, the economy, and social justice that is based on the rights of present and future generations;
- Identify sustainable community goals for environmental quality, economic viability, and social equity;
- Select sustainability criteria;
- Inventory existing natural and cultural resources;
- Identify driving forces and develop future scenarios;
- Develop alternatives for achieving sustainable community goals;
- Estimate tradeoffs among alternatives;
- Implement chosen alternative and identify policy and institutional gaps;
- Monitor the outcome, respond to feedback, and adapt the plan.

Community Empowerment

Achieving sustainability will require that communities possess not only a vision of the future and the planning skills and capacity, but also the statutory powers to support their initiatives.

Although local governments derive their powers from the Province, and while many provisions in the Municipal Act, Land Title Act, and Waste Management Act can be used to achieve sustainable community goals, these are not adequate to help communities meet all the challenges that lie ahead.

"With the minor exception of the severely restricted development permit powers, local governments do not have powers delegated to them to directly preserve natural features and resources, guard the quality of surface water and atmosphere, or avoid the creation of new environmental problems" (Don Lidstone, 1990).

In June 1990 the Sustainable Development Committee of the Canadian Bar Association, British Columbia Branch, published a collection of papers entitled "Law Reform for Sustainable Development in British Columbia". In the paper **Municipal Land Use Planning**, Lidstone put forward a set of recommendations that would give municipalities and regional districts improved statutory tools to create sustainability. Lidstone's recommendations and others that flow from the preceding pages of this paper include the need for:

- more powers to achieve environmental protection and other sustainability goals, and where jurisdictions overlap, provide for complementary actions;
- broadening of authority to cover third party use of Crown land;

- specific authority to withhold development approvals on the basis of ecological factors, social equity, and economic viability pending resolution of sustainability concerns;
- making explicit reference in the Land Title Act to sustainability considerations as a basis for withholding and guiding subdivision approvals;
- specific authority for entering into or requiring contractual arrangements with owners and developers regarding the achievement of sustainable community principles, goals, and objectives;
- mechanisms and resources to ensure that sustainability problems that transcend community boundaries are dealt with at the appropriate governmental level - regionally, provincially, and federally - in a concerted manner.

Indicators of Sustainability

Unless the means are developed to measure progress along the way, the process of reaching the targets established for the three components of the sustainable community will be somewhat similar to sailing without navigational aids in a fog. The commonly accepted method is to select certain attributes that can be used to record changes, and thereby chart the consequences on the environment, the economy, and society of actions undertaken to achieve sustainability.

Perhaps the most comprehensive attempt to measure such attributes was the Environmental Trends Program of the President's Council on Environmental Quality. Published in 1981, the report contained 264 different biophysical, environmental, and socio-economic attributes of the continental United States, including population growth, water consumption, pesticide residues in fish, radiation levels, sulphur oxide levels, and dissolved oxygen content of major rivers.

In most cases, however, neither the data nor the resources to collect the data are available to initiate a comprehensive program of measurement. Consequently, attributes must be selected that can be measured and that are held to be "indicators" of a set of conditions. These conditions might be represented by either single or multiple sets of data. Thus, a single data set might be the ratio of green space to urban development whereas an example of multiple sets might be an index of air quality, reflecting the relative abundance of a number of air pollutants together with certain meteorological parameters.

As an example, in 1990 Zero Population Growth carried out the second in its series of Urban Stress Tests. Their survey measured 11 interrelated criteria in 192 U.S. cities. The criteria used were: population change, crowding, education, violent crime, births, community economics, individual economics, hazardous wastes, water quality, air quality, and sewage. For each of the categories, cities were rated from 1 (best) to 5 (worst). "Model" communities scored 1, while those that scored 5 were "stressed". Each rating was defined so that under the sewage category, for example, model cities were defined as those with greater than secondary treatment. No model cities existed for this category but 22 stressed cities were recorded. The general conclusion reached was that the smaller the city, the more likely it was to achieve model status in one or more categories.

This table represents a candidate list of indicators of sustainability and contains both aggregated and discrete attributes. It is not intended to be an exhaustive list, but rather it suggests examples of the types of indicators that could be used to monitor change.

Sustainability Indicators
Environmental
Air Quality Index Water Quality Fecal Coliforms Dissolved Oxygen Per Capita Waste Noise Levels Species Diversity Green Space Natural Habitat
Social
Social Stress Index Housing Public Health Education Levels Recreation Food Banks Public Participation Cultural Activity
Economic
Diversity Employment Rate Average Wage Per Capita Debt Growth Rate Energy Consumption Balance of Trade

Auditing Performance

Auditing is the process of managing and controlling the performance of all of the activities required to create a sustainable community. It represents a structured and consistent approach to the evaluation of selected indicators, to their interpretation, and to an initiation of necessary adjustments should the performance not measure up to expectations.

It will require an integrated approach that recognizes the connectivity inherent in natural systems and will also require enough data to validate the process. In this context, it will be most important that agencies, and particularly provincial government agencies, take the necessary steps to ensure that data collected in the past is both available and accessible to communities. Government agencies must similarly be prepared to be responsive to needs for new or additional data that will support the use of indicators, allow the prediction of consequences, and move towards a better understanding of the ecological limits to human activity.

Issues of Ecological Limitations

The success with which ecological limitations for sustainable communities are developed and adopted depends to a large degree on the collective will and ability to resolve the environmental issues of today. The purpose of this section is to focus on key issues, rather than to provide an exhaustive list, as the starting point of a more extensive debate. In so doing, the nature of each issue will be examined together with options for its resolution, where they are known. The process of addressing and resolving these issues will present difficult choices involving land use, economic diversification, and lifestyle. These choices will have to be made, however, if the sustainable community goal is to be achieved.

For the purposes of discussion, the issues are grouped into: **Environmental Ethics**, **Environmental Quality**, and **Land Use Allocation**.

Environmental Ethics questions attitudes toward, and rights to, a livable environment. A fundamental reassessment of existing economic and social value systems in the context of ecological needs and priorities must be undertaken before any progress can be made toward sustainable community goals.

Environmental Quality is concerned with the impact of human activities on air, land, and water resources. Environmental Quality also addresses the management of those resources to meet sustainability goals, and the management of wastes.

Land Use Allocation is not only the focus of community empowerment, it is also a mechanism that will contribute significantly both to environmental quality objectives and to the fulfilment of a livable environment.

Environmental Ethics

While it has been argued that societal attitudes toward the environment have evolved through the adoption of principles such as "dominion over the earth" and "the greatest immediate benefit for the greatest number of people", it is equally arguable that we need not look to the past to discover the future. It will be necessary, however, to formulate certain basic principles or understandings to recognize that the human race, as a member of the global ecosystem, has no more or less a claim to that ecosystem than any of its other members. Similarly, it will be necessary to accept the fact that ecosystems are made up of very large and complex arrangements of interdependent components, all tending to seek an equilibrium.

While we do not enjoy a "right" to the global ecosystem, it will be necessary to consider the question of rights for both present and future generations as they relate to the scope of human activity within the ecosystem. Do we need to define rights to a livable environment that ensure that the rights of all other members of the world ecosystem are equally respected?

How would a fundamental change in societal attitudes be brought about? What are the mechanisms of change? Is it simply enough to create a "vision of the future" as the means of inspiration or will it be necessary to exercise a broad range of options including education, economic incentives and disincentives, social adjustments, and constitutional and legislative amendments?

Environmental Quality

Air Quality Issues

In general, emissions to the atmosphere that impact on global sustainability, such as the "greenhouse" gases that may lead to global warming, may be the overriding issue influencing the consideration of sustainability in British Columbia. If current scientific predictions are correct, the effects of increasing concentrations of carbon dioxide, methane, nitrogen ox-

ides, and chlorofluorocarbons in the atmosphere will have significant impacts on British Columbia by climate alteration and sea level rise.

International protocols to limit carbon dioxide emissions (as well as nitrogen oxide emissions), if implemented, would require British Columbia to reduce its share of emissions.

Although not traditionally treated as air pollution or as an air quality issue, emissions that contribute to potential global warming are likely to be the most important future issue for all jurisdictions, because of their intimate connection with energy production throughout the economy.

Smoke Management is the most often mentioned issue by those involved in air pollution control and research in British Columbia. Smoke management means control of the variety of sources that produce particulate emissions as a result of incomplete combustion of fuel.

The principal sources are slash burning, wood waste burning, residential wood stoves, forest fires, and inefficient combustion processes that generate excessive fine particle emissions.

This issue comprises both fine particle emissions that may impair human respiratory health and a combination of coarse and fine particles that impair visibility. More stringent controls on the industrial sources of smoke emissions - wood waste burners and slash burning - are already in the process of being imposed. Additional development projects are required to use wood waste materials more efficiently. Air management controls to regulate residential wood burning emissions are a major requirement in a number of areas in the Province.

Urban Air Quality. Increasing urbanization leads to increasing atmospheric loadings of fine particles and gases produced by transportation and other fuel uses, as well as by industrial processes.

Fine particles are more efficient reducers of visibility than large particles, because they are more effective light scatterers. The effect of fine particles is not just visual reduction however, they are also related to impacts on health since the fine particles can be inhaled and lodge in the lungs. Thus, visibility reduction may be one of the best indicators of overall air quality deterioration. Visibility studies have been carried out in British Columbia from a research point of view, but appropriate air quality objectives have not been developed.

Urban centres also experience high concentrations of gases such as carbon monoxide and ozone, both of which are caused primarily by vehicle emissions. In Greater Vancouver and the Lower Mainland, for example, ground-level ozone periodically reaches levels that are harmful to children, older people, and those with breathing difficulties.

Choices as to how these problems could be addressed include the development of province-wide objectives for visibility and harmful air pollutants; development of standards based on these objectives at the community (airshed) level; reduction and monitoring of vehicle emissions to meet air quality standards; and the development of alternative forms of transportation.

Airshed Management. In the future, air quality needs to be addressed on a broad scale, and the airshed concept provides that context. Airshed management addresses all of the sources of emissions into the air above a particular geographic area, where topography and meteorological conditions may constrain effective dispersal of pollutants. In this framework, existing and proposed sources are considered with respect to their cumulative impacts on air quality. Once the capacity of the airshed for a certain pollutant or group of pollutants has been reached, or is predicted to be reached with the addition of a development, other

pollutant control methods or other economic development opportunities would have to be considered.

The challenge is to determine airshed capacity for pollutants. Benchmarks, such as ambient air quality objectives or emission objectives that take into account the carrying capacity of an airshed, need to be developed. The jurisdictional authority for management of airshed-wide air quality may need to extend beyond the boundaries of existing regional districts and municipalities. This would require the province to address issue-specific, extra-regional management authority. Airshed management also implies land use, transportation, and industrial planning and management, if it is to be most effective.

Emission and Air Quality Objectives. Just as there is a need for up-to-date benchmarks for evaluating air quality, especially in the context of airshed management, the regulatory framework may need to take into account the increasing complexity of air quality impact assessment. This may become even more critical as the variety and location of emission sources grow. The establishment of appropriate objectives to control immediate effects and to help define sustainability would influence both impact assessments and monitoring strategies. A future regulatory strategy would address as well, the role played by indices of environmental quality.

The tendency of industrial development in British Columbia to occur in areas with relatively poor dispersion characteristics such as river or mountain valleys or sheltered coastal areas, means that realistic air quality impact assessment requires the use of air quality models capable of handling the complex meteorological conditions in these areas. Regulatory developments that do not incorporate enhancements to modelling would be limited in scope.

Water Quality Issues

In British Columbia, municipal water quality issues fall largely into three groups: human activity in watersheds, threats to groundwater, and treatment and infrastructure.

Human Activity Within Community Watersheds is considered a potential threat to water quality. Although the absence of human activity is not seen as a guarantee of good water quality, human activity is seen as potentially controllable and therefore an area where communities could have effective input to water quality management.

The majority of regional districts are concerned that *logging activities* in water supply areas have affected water quality or will affect it in the future. Many have noted an increase in turbidity (particulate matter in the water) since the onset of logging. Where logging has degraded water quality, water managers and planners have questioned the decision-making process regarding the economic benefits of logging. The costs of restoring water quality could potentially outweigh the economic benefits of logging.

One solution would be consideration of all resource values as part of a sustainable land use planning and allocation process. Another is to not allow logging in designated community watersheds.

A number of regional districts have expressed concern about the potential impacts of *uncontrolled recreational activities* in community watersheds. These concerns are related to the potential for biological contamination of water sources and the current lack of water treatment facilities necessary to protect the consumer. Giardia sp is currently the major biological contaminant of concern and is the leading cause of water borne infection (beaver fever) in western Canada. Illness is caused by protozoa and is characterized by gastroenteritis, diarrhoea, and vomiting. Humans, domestic pets, and

wildlife such as beaver and deer, are potential carriers of this disease agent.

Giardia is generally detected only after members of the community are already infected. There is concern that this reactive method of detection is inappropriate. Giardia is more resistant to chlorination than most biological contaminants and responds only to boiling or more sophisticated and expensive filtration processes. Advanced water treatment systems, which utilize chlorination, filtration, or ozonation and/or closed watershed programs, are the most effective means of controlling Giardia as well as other biological contaminants.

Residential development may result in the leaching of septic wastes into adjacent water supplies. A number of concerns have been expressed about Crown Land's development policies and programs in which promotion and long term leasing of residential lots in watersheds has proceeded with little or no regard for water supply considera ions. A sustainable land use planning process should include a review of potential residential development sites in water supply areas.

Groundwater contamination may become an increasingly important issue in the future as communities turn to groundwater as an alternative supply to augment, or replace, existing surface water supplies. To date where contamination has been observed and reported, it appears to have remained localized. Septic field leachate, farm runoff, and pesticide infiltration are the most commonly quoted sources. Other risks include stormwater drainage, leachate from underground gasoline storage tanks, wood waste leachate, and contamination from naturally occurring uranium deposits.

Treatment and Infrastructure. In British Columbia, a minimum level of treatment, usually chlorination and some settling, is generally all that is required to bring water up to the standards that have been set through the Canadian Drinking Water Quality Guidelines. A number of sources, both surface and groundwater, require no treatment at all. In British Columbia, only five communities have water treatment facilities beyond chlorination.

Filtration and treatment would represent a significant capital investment for any community. Although systems required by smaller communities would be less costly, the filtration and treatment system being considered by the Greater Victoria Water District would cost between $80 and $100 million.

The treatment issue is, however, as much a question of acceptable standards for drinking water quality as it is a water quality issue *per se*. The process of continually raising the standards has created significant financial burdens on communities who simply install treatment systems that allow the standards to be met. In many cases, the quality of the water supply has not changed over time. It would appear that it is time to adopt a more flexible process for developing water quality objectives and standards that would allow communities to define acceptable levels reflecting local needs and circumstances.

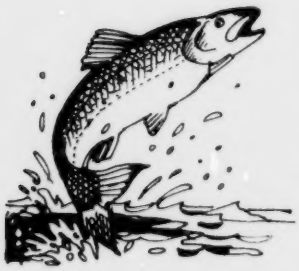
Waste Management Issues

Waste management is an issue that clearly demonstrates we have not yet been able to establish commonly accepted goals for long term environmental sustainability. We have neither a consensus as to how to achieve such goals nor a willingness to change our value systems and practices.

Garbage is an emerging problem in British Columbia. Most of our garbage is disposed of at landfills. More than 60 per cent of the landfills will be full within ten

years. Most of the material and energy in garbage can be reused, so we are wasting resources at a rate of more than two kilograms per person per day. Our approach should be to recycle the resources and energy in solid waste, and to reduce the production of material that can become waste.

Our Lifestyle. We cannot afford, in an ecological, social, or economic sense, to maintain a lifestyle that creates so much waste, which is based largely on "throw-away" principles, and that is so oriented to convenience and prolific use of packaging. Landfills, if they are not already full, are offensive and expensive; near shore waters are contaminated with chemicals; shellfish harvesting is banned over more than 70,000 hectares; and packaging to sell product is the norm in the retail industry.



It has become clear that we have to change our principles, our social attitudes, and practices. The question is, how?

Instruments of change that are immediately apparent are: education, legislation, economic incentives, and economic disincentives.

The role of education is to deliver knowledge about the generation of wastes and ecological impacts, to foster a sense of accountability, and to lay out some practical solutions for change. The approach is likely to vary according to the target audience but a strong emphasis should be placed on the school system. Environment should become a part of the curriculum. The goal must be to instil ecological value systems and voluntary practices that are in harmony with the environment. Children will educate their parents.

Education should lead to enhanced "consumer power". Changing product preferences and buying patterns of consumers will exert significant influence in the market place as the less desirable products remain on the shelves.

Education should be supported by legislation. In British Columbia it has been, and still is, common practice for government to manage the process of issuing waste management permits through the use of guidelines rather than explicit regulations. Guidelines have no direct force of law but are supported generally by statute. Assuming that we need to act quickly and effectively to deal with our waste problems, should we be demanding that everyone toe the line through more regulations and less discretionary guidelines?

In general, we can use money either as an incentive to achieve certain objectives, or as a disincentive. Is one way more desirable than another or should we use a combination of both?

It might be argued that the use of incentives seems better suited to relatively large-scale "structural" adjustments such as attracting new environmental industry through various subsidies, or providing large government grants to support waste management initiatives. Disincentives, including those of a statutory offence nature, are seen to be more instruments of avoidance or inconvenience and seem better suited as mechanisms for altering social and behavioural preferences.

It might also be argued that the use of incentive mechanisms, by virtue of their positive aspects, would be the more attractive choice. The disincentive instruments for social change cannot be ignored, however, if we are to avoid an already deepening crisis.

In summary, it is not likely that the above mechanisms will be viewed as alternative choices. Rather, an appropriate blend of all, or others, will need to be sought.

Single Source Liquid Waste Discharges. The common approach to regulating a liquid waste discharge has been to approve each one individually. As a consequence, there has been no means to assess

the combined or cumulative impact of all discharges on a particular local aquatic or marine ecosystem. Thus, we do not know whether or not we are creating harmful ecosystem effects.

The Ministry of Environment is, in a number of cases, attempting to assess the cumulative impact of discharges on a local environment. In addition, they are developing ambient water quality objectives for all key parameters, as well as specific objectives for particular watersheds. Should we not, however, be determining what the assimilative capacity of each ecosystem is and then devising a process of regulation and monitoring to ensure that this capacity is never exceeded.

To proceed in this direction it will be necessary for the provincial government to develop an ecosystem database supported by the creation of appropriate methodologies for collection, interpretation, synthesis, and application of the ecological data.

How Do We Pay The Price That Will Be Demanded? There is no question that we will all, as consumers and as generators of waste, pay both for the mess that we are in and for new ways of managing wastes in the future. We are all accountable, the issue is how?

Setting aside the purely political question of establishing priorities for spending money, both within and outside the sphere of waste management, the argument then becomes one of which mechanism to use.

There are three groups or classes of mechanism that seem to be appropriate: fee structures, product pricing, and taxation.

Fees are generally associated with the provision of services. The City of Seattle, for example, has been using volume-based garbage rates predicated on the number and size of cans used by each household. While the principal objective is source reduction (the disincentive approach), the householder maintains freedom of choice to either reduce his waste output or pay for the convenience of continuing with traditional practices.

A similar approach is to be found in Ontario as well as in many European countries in dealing with liquid wastes. Charges for residential effluent disposal are pro-rated according to individual household consumption of water and are added to the water bill.

A third component of this class is the deposit system. While it is arguable that this is not a "fee", it does retain the class characteristics of individual choice and payment for convenience. Expansion of the deposit system beyond its present limited application is not only desirable but necessary. Realistic charges, standardization of product packaging by industry, and refunds on soft drink and fruit juice containers applied at the manufacturer's level, are high priorities. In summary, this class of mechanisms is, by virtue of its freedom of choice element, the least reliable in terms of revenue generation and more attractive in terms of inducing behavioural change.

Product pricing is a mechanism that includes all costs, from cradle to grave, in the price of a product. As such, it offers a potential alternative to previously discussed methods of generating revenues if it can be applied uniformly and consistently. It is based on the assumption that higher costs will be attached to those products that are difficult to re-use or can only be landfilled, and therefore would also function as an incentive/disincentive mechanism. Uniformity of application might reduce the element of free choice associated with the previous class of options.

The question arises, however, as to how to assess and apply the post-consumer cost component - disposal/re-use/recycle. Given that the real costs will vary widely according to local conditions such as technology, disposal capacity, market

opportunities, and economics, it would seem that a flat rate would have to be applied for each item. How would it be determined?

Taxation has long been promoted as a mechanism. The notion of an environmental tax has been translated into reality with the recently introduced provincial taxes on disposable diapers, tires, and lead-acid batteries. The concept is to add, through taxation, a penalty to the production and sale of ecologically harmful, hard-to-dispose-of, or non-recyclable items or materials. These revenues might then be used to support research and development into alternative products or ecologically safe methods of disposal such as the provincial Sustainable Environment Fund.

Taxes might be assessed according to a scale of "ecological harm" or disposal cost. A concern that has been raised is how to ensure that revenues collected by government through such taxes are indeed used to support environmental initiatives.

In summary, the success of the foregoing revenue-generating mechanisms is likely to be proportional to the degree of choice given to the consumer. In most cases, there is a duality of purpose associated with many of the options, for example a revenue system coupled with behaviour change, which will demand a careful and critical selection process.

Where Are the Standards? Standards are based on units of measurement that in turn are used to develop rules about the quantity and quality of wastes that can be discharged to the environment. As a quantity, a standard may be expressed in cubic metres per day or feet of soil cover; in quality, as parts per million. Standards serve to limit waste discharges, they become the basis for enforcing the law, and they permit assessment of the health of the natural environment. Standards change over time, generally as a response to increasing knowledge or social preference.

Some of our standards, such as the Pollution Control Objectives for Municipal Type Waste Discharges, have not changed since 1975. Others, relating to water quality in rivers and standing bodies of water, have yet to be addressed in a comprehensive and public manner. Landfills may contaminate groundwater - what standards do we have to safeguard this important source of water?

Without adequate standards, how can we ensure a quality environment or measure our progress towards achieving our sustainable development goals?

A review of landfill and municipal solid waste incinerator objectives is under way by the provincial government and the final reports should be completed within the next six months.

Sharing the Accountability. In its recent Solid Waste Management initiative, the provincial government has stressed the need for "partnership in action". On all sides, we hear about cooperation, working together to achieve success, and that we are all responsible for the environment. What does it mean?

Currently, we lack a good working definition and yet this is one of the fundamental principles that we must embrace. It demands that all of the partners in our new initiative understand and agree what their respective roles are and do not undertake activities that threaten or undermine those roles.

The provincial government is addressing portions of this issue through their policy of recognizing the rights of existing stakeholders in various new waste management initiatives. Local governments seem less sure of their position and might benefit from a more open dialogue with the other "partners". Non-profit organizations are the traditional cornerstone of the grass roots recycling/conservation community, often bridging the gap between the individual and government. The retail industry seems to be intent on

defining its role in contributing to solid waste reduction.

What seems to be missing is an overall framework within which all of the partners can work in an efficient and effective manner. Should local Round Tables on Environment and Economy, or other appropriate community structures, provide the opportunity to develop such a framework?

Liquid Waste Management Planning. Section 16.1 of the *Waste Management Act* (1982) establishes targets for the submission of plans for solid wastes and biomedical wastes for Regional Districts in their entirety. In June 1990, source reduction targets and broad planning guidelines were announced by the Province for municipal solid waste and biomedical waste. To date, liquid wastes have no such guidelines, no target dates for achieving any objectives, and no mandatory Regional District focus.

As noted earlier, the long term sustainability of water-based ecosystems seems of little concern to governments. Issuing permits for discharges continues to be done on a piecemeal basis while ignoring the fact that the environment does not conform to administrative or political boundaries. Conflicts tend to arise over components of water-based ecosystems - the question of substances that are deleterious to fish, and the steadily increasing numbers and sizes of shellfish harvesting closures due to sewage and industrial pollution.

There seems to be no reason why a process similar to the Municipal Solid Waste Planning Guidelines, complete with objectives, principles, and standards should not be established, together with the necessary legislative amendment, so that we do not ignore the health of a vitally important ecosystem.

Toxic Contaminants. The contamination of our rivers, lakes, groundwater, and seas by a broad range of toxic substances is a serious problem. Leachate from landfills, household hazardous wastes, illegal dumping, discharges to storm drains in urban environments, and polycyclic aromatic hydrocarbons from automobile exhausts are but a few of the sources of toxins that contaminate our wells, our beaches, and introduce carcinogens into the food chain.

It is a complex issue that transcends the traditional solid/liquid waste boundary and it is an issue for which solutions can be found through regulation, education, use of alternative products, and treatment. What is lacking here is the overall framework within which the issue can be properly addressed.

The Three R's Policy - Reduce, Re-use, Recycle. Without a formal framework for dealing with liquid wastes, the opportunities for reduction and recycling within the liquid waste stream are largely fortuitous and are generally the results of far-sighted local initiatives.

Reductions in water use are not only achievable, but in the long term, necessary. How long will we be able to use our drinking water supplies as the medium for liquid waste disposal?

The recycling of solids in the form of sludge has many potentially beneficial applications - as a fertilizer, as the means of restoring soil structure, and as compost. Composting sewage sludge is example of the interface of solid and liquid wastes. In this case the bulking agent for the composting process is supplied from the solid waste stream.

The recycling of liquids (waste water) creates an opportunity to supply both water and nutrients through spray or trickle irrigation to forage crops, grasses, golf courses, and other applications where potable water supplies are at a premium.

While it can rarely be regarded as a sole means of waste water disposal, and while proper treatment is required to safeguard human health, waste water recycling nevertheless must be given consideration in the long term management of water supplies.

Quality of the Land Issues

Sustainable communities will not only face the challenges of air and water quality over the long term, but they may also have to deal with the immediate and pressing problem of contaminated lands. The legacy that urban British Columbia has inherited includes soils contaminated with a range of toxic substances that pose a potentially wide array of health and ecological problems. Substances such as chromium, lead, arsenic, PCBs, and chlorophenols are found in many areas of former industrial activity. The problem is often compounded because the symptoms of damage only become apparent through long term exposure to these chemicals.

Communities wishing to take some action with respect to the rehabilitation of contaminated sites will find that there is no statutory framework in British Columbia within which they are able to function. The Special Waste Regulations under the Waste Management Act do not address contaminated sites and while a special case might be made under the emergency powers of the Environment Management Act, these powers are clearly not intended to provide for the consistent regulation of such environmental harms. Accordingly, it will be necessary for the provincial government to enact specific legislation to address this issue, legislation that must encompass questions of liability.

Legislation of itself, however, will not resolve the problem unless it is complemented by the development of appropriate standards for clean-up, and a process that will provide for a thorough, public review in each case.

Communities should ensure that provisions are built into the land use planning and approval process that would take account of former industrial or commercial sites and the need for clean-up of contaminants prior to re-development.

Land Use Allocation

The planning and allocation of land use are processes that will have a significant bearing on the degree to which a sustainable community will be able to function within its ecological limitations. The maintenance of green space, the complementary preservation of urban ecosystems, the development of multi-functional neighbourhoods, the reduction in transportation linkages, and growth in the use of mass transit systems all will contribute significantly to a reduction in ecological stress.

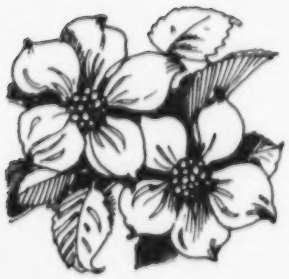
While many of the direct benefits of such programs will be most evident through enhanced air quality and reductions in energy consumption, indirect impacts in the area of social sustainability will create greater opportunities for leisure activities, alleviate the stress of commuting, and provide for more desirable community lifestyles.

In **Clouds Of Change** (June 1990), the City of Vancouver Task Force on Atmospheric Change said: "...we need to adopt land use policies which reduce our needs for transportation and let us meet those needs in more energy-efficient ways. To create more energy-efficient travel patterns we must concentrate activities in specific areas and develop a mix of land uses in those areas.

Energy-efficient land use provides a strong incentive for what some analysts call reurbanization - increasing the intensity of activity within present urban boundaries and "hardening" the urban fringe (reducing sprawl), thereby making more cost effective use of existing services, reducing infrastructure costs, and

relieving pressures on adjacent agricultural lands.

Striking a "balance" between jobs and housing is not enough, however, unless the people who work in a given area have the option of also living in that same area. This objective requires policies to encourage access by proximity, residential intensification to increase the supply of housing units, and incentives for ecologically-oriented development."



Conclusion

The task ahead is difficult and daunting. It will challenge our inventiveness and tax our capacities to the limit. It is beyond the ability of any single group, be it government, industry or the public, to accomplish. The key to success lies in the collective will to persevere and meet the challenges ahead.

In **Creating Our Future** (1990), the Greater Vancouver Regional District speaks to the future of Greater Vancouver but in this context of collaboration, it speaks for all communities:

"Creating Greater Vancouver's future must be a collaborative process - among the region's residents, community organizations, interest groups and the private sector, among the governments that serve the region. The strength of the region's planning process lies in this cooperative effort and in creating "made in Greater Vancouver" solutions that fit the region's conditions and goals.

If the region's development is managed successfully, Greater Vancouver can combine in one place the things to which humanity aspires on a global basis: a place where human activities enhance rather than degrade the natural environment, where the quality of the built environment approaches that of the natural setting, where the diversity of origins and religions is a source of social strength rather than strife, where people control the destiny of their community, and where the basics of food, clothing, shelter, security and useful activity are accessible to all."

Selected Readings

The following is a partial list of suggested further reading for those interested in the broader context of sustainable development.

City of Vancouver. **Clouds of Change**, Final Report of the City of Vancouver Task Force on Atmospheric Change, Volume 1, June 1990, 83p.

Greater Vancouver Regional District. **Creating Our Future: Steps To A More Livable Region**, Technical Report, July 1990, 29p.

James Lovelock. **The Ages of Gaia: A Biography of Our Living Earth**, Bantam Books, April 1990, 252p.

Mungall, Constance and Digby McLaren (eds). **Planet Under Stress: The Challenge of Global Change**, for, The Royal Society of Canada, Oxford University Press, 1990, 344p.

Rees, William E. **Sustainable Development and the Biosphere: Concepts and Principles**, Teilhard Studies No. 23, Spring/Summer 1990, 28p.

Sandborn, Calvin (editor). **Law Reform for Sustainable Development in British Columbia**, Sustainable Development Committee, Canadian Bar Association, B.C. Branch, 1990, 247p.

Shrader-Frechette, K.S. **Environmental Ethics**, The Boxwood Press, 1981, 358p.

Teilhard de Chardin, Pierre. **The Phenomenon of Man**, Harper and Row, 1961, 318p.

The World Commission on Environment and Development. **Our Common Future**, Oxford University Press, 1987, 400p.

How You Can Get Involved

Appendix

The British Columbia Round Table on the Environment and the Economy welcomes your comments on this paper, either in writing or at a public meeting. Please feel free to tell us your views on the issues raised in the search for a sustainable development strategy for British Columbia.

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Available Theme Papers

Sustainable Land and Water Use
Sustainable Communities
Sustainable Energy
Sustainable Development and Economic Instruments

Available Background Papers

Decision processes for land allocation
Analytical methods for land allocation
Water allocation and management
Population changes
Air quality issues
Municipal water issues
Waste management issues
The British Columbia economy
Economic incentives
Resource accounting
Energy development processes
Transboundary issues